Office of the Assistant Secretary for Aviation and International Affairs

Domestic Aviation Competition Series

Dominated Hub Fares

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Introduction

Airline deregulation has proven to be a remarkable success over the past two decades. The development of hub-and-spoke network systems and the creation of low-cost point-to-point carriers and other types of new service in the airline industry have provided the flying public with better service and inflation-adjusted fares that continue to decline overall. However, the fruits of deregulation have come at a steep price for passengers in certain markets.

Network hubs are a central component of today's aviation infrastructure. While hub-and-spoke networks provide substantial service benefits to consumers, particularly more nonstop service to a greater number of destinations, there are also drawbacks. From a consumer perspective, the primary disadvantage of network hubs is the level of market power that the hub carrier is capable of amassing and the higher prices consumers pay as a result. This stems from the fact that no airline with a similar cost structure can compete effectively at another airline's hub. DOT and others have reported on the prevalence of high fares paid by passengers at hub airports dominated by a network carrier; indeed, no credible study concludes otherwise.[1]

The basis of higher fares at hubs is nevertheless a contested issue. It is the view of some, including the Department, that high fares at dominated hub airports are, in large part, a result of the market power exercised by network carriers at their hubs. Some others attribute high fares at hubs to a number of other factors including passenger mix, higher quality of service at hubs, higher costs of serving business passengers, and the Southwest effect. This paper briefly covers each of the four rationalizations commonly used to justify hub premiums, and then presents a new measure of fares at hubs that we believe presents a truer measure of fare premiums at dominated hubs than comparing fares at hub markets with fares at non-hub markets as we have previously done.

Findings in Brief

Calculating fare differentials in hub markets with no low-fare service compared to hub markets with low-fare competition shows the following:

- **In dominated hubs as a whole, 24.7 million passengers pay on average 41% more than do their counterparts flying in hub markets with low-fare competition. It is reasonable to expect that with the benefit of low-fare competitors another 25 to 50 million passengers annually would travel in these markets.**

[1] A hub study prepared by Professors Darryl Jenkins and Robert Gordon and funded by Northwest, "Hub and Network Pricing in the Northwest Airlines Domestic System," purports to show that Northwest fares in its nonstop hub markets are lower than Northwest fares in competitive connecting markets. Aside from finding the study's conclusion implausible, we have been unable to determine how the authors reached their result. The authors have not responded to our requests for further detail about the analytical model used. Furthermore, the study's conclusion depends primarily on acceptance of the idea that the passenger mix at hubs is a justification for higher prices -- a contention we rebut in this paper.

- **Passengers in short-haul hub markets without a low-fare carrier pay even higher fares, or 54% more on average than passengers in comparable markets with a low-fare competitor.**

- **Charlotte, Cincinnati, Minneapolis, and Pittsburgh have the highest overall fare differentials. This is consistent with findings in past studies, in spite of differing methodology.**

- **The four rationales commonly used to explain away high fares in hub markets – passenger mix, operational cost, quality of service, and the Southwest Effect --only apply if price competition is not present. It is the lack of price competition, not the rationales listed, that explain high prices at hub markets.**

It is important that the presence of high fares at hubs be understood by those that are affected. To the extent that consumers and their local representatives are aware that they are penalized by high airline prices, they have the incentive to seek competitive alternatives. This is the primary reason why we will continue to provide information about price to consumers, and to resist efforts to downplay the magnitude of the fare penalty millions of passengers pay, and the absence of service millions more could enjoy if more competitive prices were available.

The negative effects of high hub fares reach beyond hub cities. Spoke communities whose service is predominantly to network hubs by hub dominant carriers may also be subjected to high prices. Buffalo, New York provides a good example of this, and also the benefits of low-fare competitive alternatives. People at Buffalo, and their elected representatives, worked hard to attract low-fare service and they have succeeded. The benefits, in terms of increased service and lower prices, are enormous. For example, average fares declined by 36%, from $185 to $119, in the Atlanta-Buffalo market after AirTran's entry, and the number of passengers in the market increased by 65%. A catalog of analyses the Department has completed recent years that demonstrate the competitive consequences of low-fare entry or exit at cities or in city-pair markets can be found at http://ostpxweb.dot.gov/aviation.

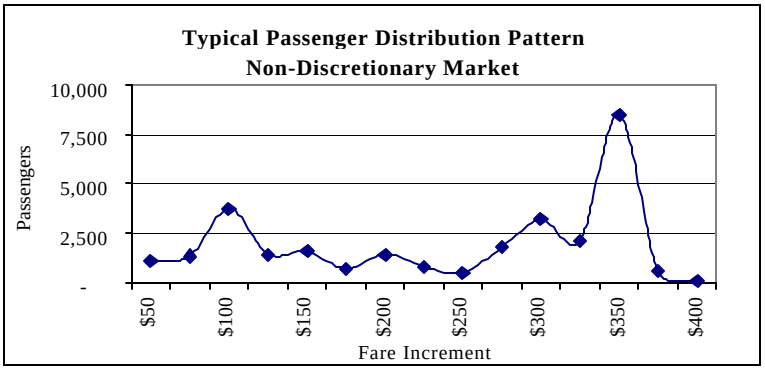
Hub Premium Rationalization #1: Passenger Mix

> *Hubs are business centers. High hub fares merely reflect demand for high-quality businesses services.*

The primary rationalization for high hub fare premiums is that hub traffic consists of a high portion of business traffic relative to leisure traffic. The large percentage of passengers buying unrestricted or less restricted, high-fare seats results in a high average fare. Hubbing airlines sell few discounted seats because, according to this line of reasoning, the bulk of demand in hub markets is for unrestricted business fares, which tend to be high. The low demand for restricted leisure travel purportedly contributes to the higher average fare.

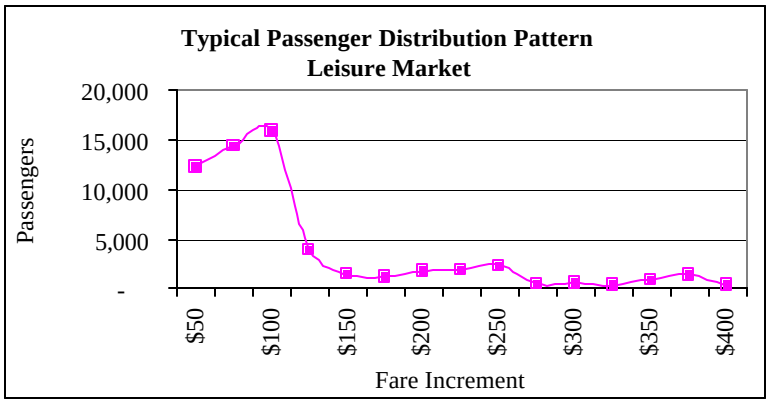
According to this argument, airlines choose cities with a high concentration of business travel for their hubs. The mix of local traffic at hubs is merely a reflection of the demand for high-frequency service and last-minute travel. Non-hub markets, on the other hand, have a greater portion of discretionary travelers who are price-sensitive. As a result, comparing business-rich hub markets with the industry in general, and more specifically in terms of average fares, is inapt because of the difference in passenger mix.

The following two graphs illustrate the passenger trends typically found in a business market versus what is typically found in a highly discretionary leisure market:



A market with a high concentration of business travelers would tend to have passengers clustered at high fare levels, with the remaining passengers more evenly spread throughout lower, discount-fare levels.

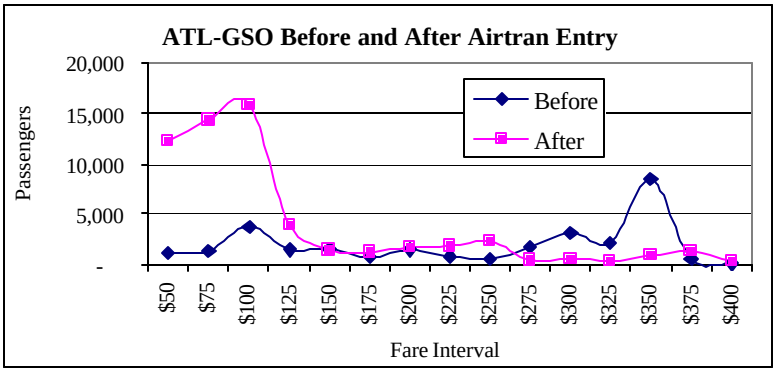
Conversely, prices in markets dominated by leisure passengers are clustered at discount levels, because demand for less-restrictive business fares is less prevalent.



According to those that argue that high hub fares are the result of passenger mix, the distribution of passengers in the non-discretionary market is a reflection of demand. Most of the passengers in this market used as our example are business passengers willing to pay a higher price for fewer restrictions and more service. Thus, many passengers pay relatively high fares in this market, resulting in an average fare of $228 each way. The leisure market demand curve is a reflection of passengers who demand low prices and who will accept flexible itineraries and off-peak flight times in order to

pay low prices. Because demand for the higher service levels with fewer restrictions does not exist, the airlines are less able to price discriminate. The resulting average fare is $108 each way.

However, the difference in prices charged in these two examples is not demand driven, or quality-of-service driven. These two graphs -- which seem to epitomize the demand differences in business and leisure markets -- are in fact graphs of passenger traffic in the Atlanta-Greensboro market before and after entry by AirTran. The difference in prices charged is due to the introduction of new competition in the market. After entry by AirTran the number of seats made available to consumers at low-fares increased significantly. Total passengers in the market doubled, and the average fare fell by half.



Before low-fare entry, ATL-GSO showed the classic passenger distribution of a business-heavy market. After AirTran introduced competitive pressures, the true demand for low-fare seats is evident.

This example demonstrates that the 'business-market' demand curve prior to AirTran's entry was not reflective of true demand in the market, and raises an important public policy issue. While some network airline hubs are important business centers, low-fare demand is being curtailed, not met, by the disproportionate number of network airlines' seats reserved for passengers willing to pay business fares. The introduction of price competition limits the dominant carrier's ability to limit both overall capacity and availability of lower-fare seats. In this example, 36,200 more passengers paid fares of less than $100 after low-fare entry. This far surpasses the total number of passengers in the market before AirTran's entry. In addition to the several thousand business passengers who now pay lower fares, it is likely that additional business passengers who were unwilling to pay $700 to fly round trip were willing to travel by air for less than $200. The fare benefits of low-fare competition are not limited to business travelers. The Atlanta-Greensboro example demonstrates that price sensitive travelers not only benefit from greater seat availability, many enjoy even lower fares than were previously available to all but a very few passengers.

The illustration also demonstrates another important flaw in the traffic "mix" argument; namely, the reason for high fares not only hinges on mix, but also on the continuation of the high fares charged in the absence of an effective price competitor, particularly for business passengers. The Atlanta-Greensboro illustration shows that with an effective price competitor, most business travelers pay much lower fares. Once more low-fare seats became available, only 3,230 passengers were willing to pay a high fare (greater

than $300) for the service features offered by the network airline, compared to the 11,380 passengers that paid those fares before Airtran entry.

It is evident that a strong demand for low-fare seats remains unmet in markets without low-fare competition, and that the pent-up demand for low-fare service is enormous. The Department has illustrated this point repeatedly in the *Domestic Airline Fares Consumer Report* and in *The Low Cost Service Revolution*. This is why discount prices are not only subject to travel restrictions such as advance purchase and over-Saturday night stay aimed at discouraging their use by business travelers, but are also subject to capacity control provisions that limit seat availability. Many more passengers than currently fly in discounted seats would be willing to trade travel restrictions for lower fares if the network carriers made such seats available.

Even true discretionary markets that already enjoy significant low-fare seat availability still benefit from low-fare competition. Although fares may not change so dramatically when a new competitor enters a discretionary market, the total number of seats made available may increase greatly. The Buffalo - Tampa market provides an excellent example of this. The average fare before AirTran entry was $145; after entry it dropped by only $13. In spite of the rather modest fare reduction, passenger levels increased by 40%—stimulated by newly available capacity.

The Atlanta-Greensboro illustration is not intended to fault the practice of price discrimination. Some price discrimination occurs even in highly competitive airline markets, although the dispersion between discretionary fares and business fares is much less pronounced. Ironically, the argument that price discrimination-- by allowing carriers to charge higher fares to time-sensitive passengers-- benefits discretionary passengers is not valid in the absence of a price competitor. As already shown in the Atlanta-Greensboro example, hub dominant carriers charge business passengers high fares, but they also severely limit the availability of low-fare seats.

Finally, not all low-fare entry will result in traffic growth and fare declines as pronounced as they are in the example provided, although some produce even greater consumer benefits[2]. However, even modest growth in low-fare seat availability is undeniably a benefit to the flying public. Turning back the clock a few years would produce scores of

[2] An aggregate examination demonstrates the positive benefits of low-fare entry. In the 19 large, short-haul hub markets that gained and kept low-fare entry since 1997, aggregate average fares have declined. Even when the fare decline is more modest, passenger level growth is substantial. While many detractors have criticized the use of average fares in analysis, we feel satisfied that they provide important information about the competitive condition in individual markets.

	< 250 Miles	250-500 Miles	500-750 Miles
Avg Fare Before Entry	$ 177	$ 156	$ 213
Avg Fare After Entry	$ 79	$ 96	$ 143
Change in Passengers	86%	65%	61%
Change in Avg Fare	-55%	-39%	-33%

hub markets with high average fares that would fit the "passenger mix" argument and other baseless rationalizations used to explain high hub fares. Those same markets now enjoy low prices due to the successful entry of low-fare competitors.

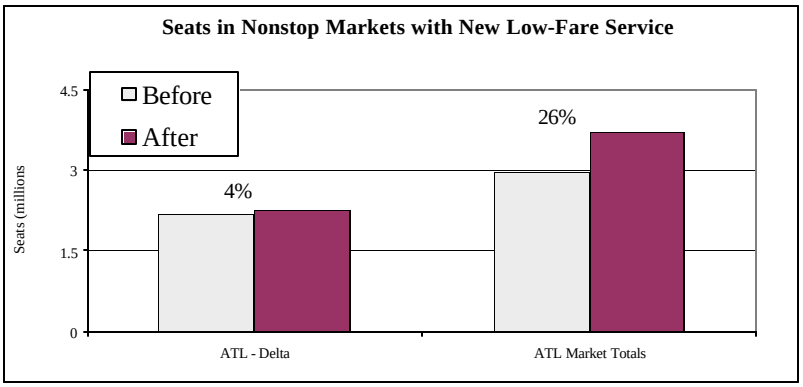
Many city-pair markets that clearly fall into the "business" rather than the "discretionary" category benefit from very competitive prices as reflected not just by average fares, but the level and distribution of all traffic. Before and after (low-fare entry) comparisons in these markets leave absolutely no doubt about how effective price competitors affect traffic mix and fare levels in business markets. Thus the "mix" argument is wrong, per se, because it fails to acknowledge the huge unmet low-fare demand, and it is also wrong as an explanation for high fares because it fails to acknowledge the effect of price competition on fare level. For these reasons, this example -- and numerous others like it -- calls into question the assertion that the high fares paid in dominated hub markets are a reflection of consumer demand for high-end service. This point is further supported by fare level changes at Nashville, Raleigh, and Dayton after they lost network hub status. In all three cases, fare premiums were ameliorated when hubbing operations were suspended, while presumably the nature of demand in the city did not change.

Hub Premium Rationalization # 2: Quality of Service

High fares at hubs reflect higher quality of service at hubs.

It has been argued that the cost to consumers of high hub fares reflects the superior service that hub travelers receive in the way of frequent service. This argument is not valid for a variety of reasons. One single straightforward fact undermines the argument: namely, when a low-fare competitor enters a market the previous fare premium either greatly diminishes or disappears altogether. Even the dominant hub carrier typically lowers fares while maintaining service. In other words, when an effective price competitor enters a high fare market, the hub carrier's purportedly higher quality of service does not continue to command the previous high fares. Thus, the high fares at hubs are related to an absence of effective price competition, not quality of service.

Furthermore, the entry of a low-fare competitor into a hub-spoke route normally results in increased capacity in the market. While the new entrant adds frequency and seats, the incumbent carrier also typically maintains seats and frequencies. In a review of nonstop markets out of Atlanta that have new low-fare entry, all of the markets had more seats and departures than before low-fare entry. Overall, seats in the ten nonstop Atlanta markets increased by 26% and departures grew by 29%. Delta increased departures and seat availability by 2% and 4% respectively. Atlanta – Flint nonstop service was not available until AirTran's entry. Detailed information on nonstop service is available in Appendix A.



This highlights two important facts. First, the presence of a hub results in more service than would otherwise be available on many spokes. However, to the extent dominant hub carriers have market power, they can not only charge higher prices, but also control capacity, keeping it at a lower level than would prevail in a competitive market. Carriers with market power typically do not add capacity to accommodate low-fare demand. Second, incumbent carriers reduce prices, even for business travelers, while simultaneously maintaining service quality when a low-fare competitor enters a market. This common occurrence provides further evidence that service quality fails to explain high fares.

It makes no sense to argue that superior service causes high business fares when upon entry by a price competitor, fares decline precipitously at the very same time that service in the market increases. While the data clearly show that business travelers are willing to pay very high prices in the absence of price competition, the difference in fares being charged on similar routes with and without low-fare service leaves no doubt that it is the absence of competition, not the level of service, that produces substantial fare premiums in many hub markets.

Below is a sampling of hub city-pairs from the 1st quarter 2000 Domestic Airline Fares Consumer Report. In each instance the presence of a low-fare competitor results in substantially lower average fares. A comparison of St. Louis to Detroit and St. Louis to Minneapolis provides an interesting contrast. Both Detroit and Minneapolis are Northwest hubs, and both are approximately equidistant to St. Louis. Northwest provides one-third fewer flights between St. Louis and Minneapolis[3]-- yet the average fare paid between St. Louis and Minneapolis is over three times the average fare paid between St. Louis and Detroit, where Southwest competes.

[3] In the first quarter of 2000, Northwest reported 990 flights between St. Louis and Detroit vs. 652 flights between St. Louis and Minneapolis. Source: US DOT T100 Segment data.

Fare Comparisons: Comparable Markets with and without Low-Fare Competition

Origin	Destination	Nonstop Distance	Passengers Per Day	Avg One-Way Fare	Low-Fare Carrier
Atlanta, GA	Dayton, OH	432	594	$126	AirTran
	Indianapolis, IN	432	430	$242	
St. Louis, MO	Detroit, MI	440	1,008	$83	Southwest
	Minneapolis, MN	449	450	$259	
Cincinnati, OH	Philadelphia, PA	507	341	$278	
	Kansas City, MO	539	166	$156	Vanguard

These fare differences are representative of those in many hub markets. The explanation of the difference is, consistently, the presence or absence of low-fare competition.

Discussions on low-fare competition and hub service often involve claims that small communities will lose service altogether when carriers are forced to compete with low-fare carriers. Our informal analysis of service at Atlanta, Denver, and Salt Lake City showed no evidence that incumbent carriers were forced to pull service out of small communities when faced with price competition (see Appendix B). As is illustrated by the low load factors of many of the business markets listed in Appendix C, a hubbing carrier can become a more effective competitor simply by making more seats available at low prices.

Hub Premium Rationalization #3: Cost Basis

Higher fares at hubs are justified on a cost basis.

This argument contends that business travelers demand frequent service and last minute seat availability, both of which are costly to provide. Undoubtedly, the requirements of business travelers are more costly to meet than the requirements of passengers who are not as time sensitive or who have the flexibility to make their travel plans further in advance. Nevertheless, higher costs are not the correct explanation for the high fares that exist in many markets where the discipline of a price competitor is not present.[4]

We have repeatedly demonstrated the large reduction in prices that typically follows entry by a low-fare carrier in markets with a history of high average fares, and thus, high fares for business travelers. If one held to the cost argument, it would appear either that post-entry business fares charged by hub-dominant airlines are below cost, or pre-entry fares were substantially above cost. The latter would appear to be more likely given the large number of business city-pair markets that have a low-fare alternative and, as a

[4] Connecting banks are expensive to operate due to the need to hold aircraft at gates for connecting traffic. However, we do not accept the argument that hubs are high-cost in absolute terms. In terms of operating costs there are a variety of offsetting factors, such as the cost of creating service and traffic peaks, and the ability of operate larger, more efficient equipment as a consequence of network traffic flows. Furthermore, the network associated with a hub allows the hub carrier to serve the vast majority of cities more efficiently, and generates additional network revenue that more than compensates for any higher operating costs that may be present. Hubs result in lower costs per passenger, which is a clear benefit of the deregulated airline industry that gets buried when hubs are described as high-cost.

result, enjoy low prices. Apart from this, we have two broad concerns about using cost as a basis for justifying high hub fares.

First, the argument is based on the inaccurate assumption that carriers operate extra frequency on spoke routes just to carry business passengers to and from the hub. Rather, the service and operational infrastructure associated with hub operations exist to serve connecting passengers flowing over the hub, not just local passengers. Thus, the extra frequency on hub-spoke routes is necessary to support increased traffic flows through the network. This is why carriers develop hubs. Business travelers to and from the hub city benefit from frequent service, but network flows clearly are a principal reason for high frequencies on most hub spoke routes, and conversely, virtually all spoke routes would have substantially lower frequency without the network flows.

It is widely accepted that network passengers that are served on a connecting basis over hubs benefit from lower prices due to network competition. Thus, the very passengers that cause carriers to operate extra frequency on spoke routes to and from hubs, and purportedly cause higher operating costs as a result, benefit from competitive fares. Local passengers traveling between the hub and its spoke cities, on the other hand, who are not primarily responsible for the extra frequency, are charged higher fares because they do not have the benefit of aggressive price competition.

A second fundamental flaw in this argument is the presumption that the provision of frequent service is always costly and inefficient. While the delivery of frequent service in some less-dense markets may result in higher costs, high-frequency service can also result in lower unit costs due to better utilization of assets. In this regard, high hub fares are most out of line in dense markets where traffic is sufficient to support frequent service and larger, more cost efficient aircraft that could result in lower, not higher, unit costs.

We have one further observation to make concerning the relationship between cost and fare levels at hubs. All major network carriers incur the cost of providing frequent service in highly discretionary markets in order to accommodate large numbers of lower-fare passengers. The average fares and business fare levels in discretionary markets are consistently lower than fares in other hub markets, in spite of the fact that both are served with high frequency. This is contrary to the claim that high frequency out of hubs necessarily entails high prices. Clearly, the lack of price competition, not costs, is what drives high prices in hub markets.

Hub Premium Rationalization #4: The "Southwest Effect"

> *High hub fares may not reflect the harmful exercise of market power, but simply higher fares that carriers charge in markets where they do not have to compete with Southwest.*

The entry of Southwest Airlines into a market virtually always has a profound effect on price and traffic. Although Southwest serves two concentrated hub airports, Salt Lake City and St. Louis, it has been Southwest's strategy to avoid entry into concentrated hub airports, choosing instead to serve less-congested secondary airports. This has lead to the illogical argument that all Southwest markets should be excluded from hub fare analyses when comparing hub fares to non-hub fares, because Southwest markets pull down averages in the entire non-hub market sector, resulting in an unrealistically low base of comparison.

The essence of the Southwest argument appears to be simply that the absence of Southwest in a market justifies high prices. This argument makes no sense. We are not aware that proponents of this argument offer any factual or even theoretical basis as to why this may be so. Indeed, those that raise the "Southwest Effect" in defense of high fares also try to minimize the significance of high fares by pointing to the continued expansion of service by Southwest and others. In doing so they implicitly acknowledge that hub fares are above the competitive level, but may be disciplined at a later date. While we also anticipate that over time price competitors will enter many high-fare markets, this prospect does not change the level of fares that exist today in the absence of an effective price competitor. The absence of price competition today may explain the high level of fares that exist but do not justify those prices.

As noted, Southwest does extensively serve two highly concentrated airports and also provides limited service to Detroit.[5] Also, Southwest serves alternate airports at cities used by other carriers as hubs—Hobby at Houston, Midway at Chicago, and Dallas' Love Field—where it has a major effect on network carriers fares at their respective airports. Clearly, Southwest's presence affects price in scores of hub markets. It is also important to note that Southwest is not the only low-fare airline that competes down price at dominated hubs. AirTran, for example has had a major impact on price and traffic for many Atlanta markets.

As mentioned above, turning the clock back a few years would reveal many markets that were subjected to high fares until an effective price competitor started service. We do not believe that the high fares in those markets preceding new entry were any more justified than the high fares that currently exist in hub markets without price competition. Therefore, there is no basis for removing the "Southwest Effect", or the effect of other low-fare competitors, from hub fare analyses. To the contrary, it is important to continue to identify the meaningful differences such competitors have on price and traffic, and to encourage communities that lack such competition to actively seek it.

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[5] Our hub premium calculations, including those in this study, have generally focused on single-airport cities that are dominated by a single network airline. That does not mean that similar problems to not exist at network hub airports in multiple-airport cities. The city of Dallas, for example, had the eighth highest fare premium nationwide in a *Domestic Airline Fares Consumer Report* Special Feature from the 3rd quarter of 1998, a larger premium than existed in most single-airport cities where a single network carrier held the dominant share of the market. Significant fare premiums were also found for New York and Houston.

Fare Differentials at Hubs without Low-Fare Competition

In the past, the Department has attempted to highlight 'pockets of pain'-- areas where average fares were exceedingly high. The focus of these attempts was network carrier hub cities where the network carriers were able to exercise inherent market power. In order to demonstrate the degree to which fares in dominated local hub markets exceeded fares in comparable non-hub markets, comparisons were made between hub and industry-wide data, with adjustments made for distance and density. While critics responded that the hub premium calculation was unfair for various reasons, as we have discussed, our use of broad average fares in the calculation of these fare premiums tended to overlook some very specific problems that had the effect of understating the fare problem at hubs. For instance, our broad comparisons of fares at hubs versus similar non-hub markets hid the fact that fare premiums in short-haul hub markets are much higher than those in long-haul markets.

Based on observations of the difference in passenger distribution according to the competitive status of individual markets, we have concluded that rather than only compare hub markets to non-hub markets, it may be even more to the point to compare hub markets with and without low-fare competition to each other. Undeniably, the presence or absence of a low-fare competitor has a profound effect on price. This approach also addresses any concerns that hub and non-hub markets may not be comparable.

The following table details the percentage fare differential that exists in hub markets with no low-fare presence compared to hub markets with a low-fare competitor. (More detailed information on these figures can be found in Appendix D.)

Fare Differentials at Hub Markets without Low-Fare Presence vs. Hub Markets with a Low-Fare Competitor (YE 1999)

Dominated Hub	Short-Haul Markets	Long-Haul Markets	All Markets	Affected Passengers
ATL	49%	28%	41%	4,796,380
CLT	75%	23%	54%	3,590,790
CVG	78%	35%	57%	1,936,020
DEN	37%	28%	29%	4,533,600
DTW	51%	21%	40%	2,457,090
MEM	57%	29%	43%	885,750
MSP	46%	63%	55%	2,758,600
PIT	86%	18%	57%	2,920,250
SLC	-6%	6%	2%	1,041,780
STL	38%	61%	49%	2,390,370
All Hubs	54%	31%	41%	24,738,900

*Discretionary markets and city-pairs where low-fare competitors held between 1% and 9% of market share excluded.

- In dominated hubs as a whole, 24.7 million passengers pay on average 41% more than do their counterparts if flying in hub market with low-fare competition. It is

reasonable to expect that with the benefit of low-fare competitors, most of these passengers would enjoy lower fares… substantially lower fares in many instances. It is also reasonable to expect that with the benefit of low-fare competitors another 25 to 50 million passengers annually would travel in these markets.

- Passengers in short-haul hub markets without a low-fare carrier fare even worse, paying 54% more on average than passengers in comparable markets with a low-fare competitor.

- Charlotte, Cincinnati, Minneapolis, and Pittsburgh have the highest overall premiums. This is consistent with findings in past studies, and with calculations of hub premiums performed against non-hub markets.

- Salt Lake City, where Southwest has many flights, also has low fares to airports that Southwest does not serve. The Short-Haul subset is heavily weighted by cities that benefit from the "halo" effect of Southwest service to other airports (for example, airlines serving the Salt Lake City – San Francisco route must compete with Southwest's Salt Lake City – Oakland flights).

As is our standard practice in analyses comparing fares, we have adjusted for distance and density. Also, in our comparison of markets, we limit non-low-fare markets to those that have comparable low-fare hub markets in terms of distance and density. Thus, the fare differentials calculated were not affected by fares in the types of markets that do not have low-fare competition, such as very lightly traveled, longer distance markets.

Conclusion

The facts are clear. Without the presence of effective price competition, network carriers both charge much higher prices and curtail capacity available to price sensitive passengers at their hubs. Quality service and reasonable fares are not mutually exclusive goals. With effective price competition, consumers benefit from both better service and lower fares. Atlanta and Salt Lake City serve as excellent examples of how network carriers can operate a successful hub in the presence of low-fare competition.

The key to eliminating market power and fare premiums is to encourage entry into as many uncontested markets as possible. Although this paper focuses on fares at hubs, hub markets are not the only markets that fall victim to market power pricing. Barriers to entry at many non-hub markets have the same effect of discouraging new entry. However, barriers to entry at dominated hubs are most difficult to surmount considering the operational and marketing leverage a network carrier has in its hub markets.

Appendix A – Service Changes in Atlanta City-Pair Markets After Low-Fare Entry

		Incumbent Network Carrier - Delta							
		Departures			Seats			Load Factor	
		Before	After	Change	Before	After	Change	Before	After
Atlanta to:	Buffalo	551	544	-1%	76,327	81,021	6%	69%	69%
	Dayton	912	901	-1%	129,434	127,956	-1%	63%	78%
	Flint								
	Greensboro	1,427	1,428	0%	192,460	206,730	7%	64%	70%
	Gulfport								
	Houston	1,891	1,997	6%	248,266	273,662	10%	63%	66%
	Knoxville	1,646	1,632	-1%	237,800	234,518	-1%	64%	78%
	Miami	1,867	1,984	6%	412,299	443,752	8%	75%	78%
	Myrtle Beach								
	New York	5,092	5,118	1%	875,338	882,516	1%	77%	82%
ATL Total		**13,386**	**13,604**	**2%**	**2,171,924**	**2,250,155**	**4%**	**71%**	**77%**

		Market Total							
		Departures			Seats			Load Factor	
		Before	After	Change	Before	After	Change	Before	After
Atlanta to:	Buffalo	551	1,062	93%	76,327	136,535	79%	69%	58%
	Dayton	912	1,435	57%	129,434	186,401	44%	63%	67%
	Flint		496			53,044			40%
	Greensboro	1,625	2,119	30%	204,666	273,468	34%	64%	65%
	Gulfport	1,308	1,949	49%	43,732	99,392	127%	66%	74%
	Houston	3,225	4,149	29%	402,479	533,043	32%	65%	62%
	Knoxville	1,651	2,143	30%	238,376	290,206	22%	64%	70%
	Miammi	3,009	3,869	29%	582,313	688,781	18%	68%	73%
	Myrtle Beach	1,820	1,888	4%	112,382	122,234	9%	58%	64%
	New York	7,410	8,602	16%	1,169,030	1,342,180	15%	76%	77%
ATL Total		**21,511**	**27,712**	**29%**	**2,958,739**	**3,725,284**	**26%**	**69%**	**71%**

Source: US Department of Transportation T-100 Segment Data
Markets selected are top-1000 domestic markets out of Atlanta where low-fare service has been introduced on a nonstop basis since the first quarter of 1997. The new entrant was still serving the markets listed in the first quarter of 2000.

Appendix B – Service Changes at Hubs After Low-Fare Entry

United Airline Service out of Denver Before and After Low-Fare Entry	September 1994	September 1997	% Change
Foreign Hub Frequencies		119	
Foreign Hub Seats		15,314	
Large Hub Frequencies	6,730	8,077	20%
Large Hub Seats	937,071	1,109,994	18%
Medium Hub Frequencies	4,948	5,064	2%
Medium Hub Seats	611,394	666,345	9%
Small Hub Frequencies	3,408	3,405	0%
Small Hub Seats	297,625	275,283	-8%
Nonhub Frequencies	1,138	1,159	2%
Nonhub Seats	79,055	70,772	-10%
Total Frequencies	16,224	17,824	10%
Total Seats	1,925,145	2,137,708	11%

Delta Service out of Atlanta Before and After Low-Fare Entry	March 1993	March 1996	% Change
Foreign Hub Seats	193,222	250,739	30%
Foreign Hub Frequencies	843	1,294	53%
Large Hub Seats	2,141,616	2,576,366	20%
Large Hub Frequencies	11,804	14,145	20%
Medium Hub Seats	1,155,978	1,323,223	14%
Medium Hub Frequencies	6,887	8,000	16%
Small Hub Seats	1,273,268	1,473,834	16%
Small Hub Frequencies	10,097	11,080	10%
NonHub Seats	605,328	619,473	2%
NonHub Frequencies	11,529	11,938	4%
Total Seats	5,369,412	6,243,635	16%
Total Frequencies	41,160	46,457	13%

Delta Service out of Salt Lake City Before and After Low-Fare Entry	March 1993	March 1997	% Change
Large Hub Frequencies	4,495	5,052	12%
Large Hub Seats	755,142	843,391	12%
Medium Hub Frequencies	2,960	3,677	24%
Medium Hub Seats	396,532	468,757	18%
Small Hub Frequencies	1,596	2,275	43%
Small Hub Seats	168,040	205,329	22%
NonHub Frequencies	3,897	5,289	36%
NonHub Seats	203,846	258,986	27%
Total Frequencies	12,948	16,293	26%
Total Seats	1,523,560	1,776,463	17%

Source: US DOT T3 Database; T100 Database

Appendix C – Load Factors in Selected Hub Business Markets

March 2000; One-way

Hub	Destination	Carrier	Trips	Onboard Passengers	Seats	Load Factor (%)
DTW	BOS	NW	227	21,034	35,049	60
	EWR	NW	257	25,924	37,894	68
	JFK	NW	116	7,336	13,130	56
	ORD	NW	293	27,601	38,708	71
PIT	BOS	US	204	19,613	29,141	67
	EWR	US	199	13,602	25,972	52
	LGA	US	259	22,216	35,186	63
	ORD	US	200	13,574	26,638	51

Source: US DOT T100 Database

Appendix D - Hub Fare Differential Methodology

Data used to derive hub premiums in this study came from carrier submissions of Origin & Destination (O&D) data to the Department of Transportation. City-Pair markets were restricted to those that averaged more than twenty O&D passengers per day in 1999. Discretionary markets – removed from the analysis – were defined as any city-pair that included a point in Florida or Arizona, or included New Orleans, Las Vegas, Reno, or Atlantic City. Low-Fare markets were defined as any city-pair in which a low-fare carrier held 10% or more of the O&D passenger market share. City-pairs in which a low-fare carrier maintained a presence under the 10% market share level were removed from the analysis.

Fare and traffic data for the low-fare city-pairs at all ten hubs (the control markets) were aggregated to form the base against which data from each hub's non-low-fare city-pair markets were compared in formulating the fare differential. Average yields at each hub's non-low-fare city-pair markets were compared to yields at control markets of similar distance and density. The difference calculated from this comparison was then weighted to reflect passenger distribution in the non-low-fare markets.

Dominated Hubs
Dominated hubs were defined as the 10 cities (cities as a whole, not specific airports) in which a single hubbing network carrier enplaned more than 65% of passenger traffic. Our decision to use cities, rather than airports, to measure dominance resulted in the exclusion of some heavily concentrated network hub airports in multiple-airport cities, such as Dallas, Houston, and New York. It would have been possible to measure fare premiums on an airport basis, but in order to keep the analysis as straightforward as possible, we have chosen to hold to a definition that excludes network hubs in multiple-airport cities.

The exclusion of multiple-airport cities from this study does not indicate that network hub airports in those cities do not also experience fare premiums. For example, despite low-fare service provided by Southwest Airlines at Love Field in Dallas, the Dallas/Ft. Worth area had the eighth highest fare premium nationwide in a *Domestic Airline Fares Consumer Report* Special Feature from the 3rd quarter of 1998, a larger premium than existed in most single-airport cities where a single network carrier held the dominant share of the market. Significant fare premiums were also found for New York and Houston.

Low-Fare Carriers
Access Air, Airtran, American Trans Air, Eastwind, Frontier, Kiwi, National Airline, Pro Air, Reno, Southwest, Spirit, Sun Country, Tower, Vanguard, Western Pacific.

Discretionary Markets
Arizona, Florida, Atlantic City, Las Vegas, New Orleans, Reno.